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AUTHOR Rosenblatt, Sidney M.
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ABSTRACT

This program, funded under Elementary and Secondary Education Act Title I, for eligible non-public school students in New York City consisted of corrective mathematics services and other supportive services. The supportive services were guidance, homework help and paraprofessional assistance. The program was aimed at first through twelfth graders, who were six months or more deficient in math. Instruction was in small groups with periods of individual instruction where applicable. The program emphasized a positive approach to remediation, an abundance of materials, a discovery approach to learning real life expereiences and the use of games. Analysis of the data showed that the the average student gained ten months over what his/her predicted scores would be in ten months of instruction. The guidance and homework helper supportive services had a statistically significant effect on learning as measured by test scores. The paraprofessional services were not shown to be statistically significant as a factor in successful student learning. (Author/AM)

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ED137471

EVALUATION REPORT

Function No. 09-59628

Corrective Mathematics Services for Eligible Non Public School Pupils

Evaluation Period
School Year: 1974-1975

Sidney M. Rosenblatt, Ph.D.

UD 16859

An Evaluation of a New York City School district educational project funded Under Title I of the Elementary and Secondary Education Act of 1965 (PL 89-10) performed for the Board of Education of the City of New York for the 1974-75 school year

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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OFFICE OF EDUCATIONAL EVALUATION
110 LIVINGSTON STREET, BROOKLYN, N. Y. 11201

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Chapter I

The Program

The corrective mathematics services for eligible Title I pupils in the non-public schools is designed to offer remedial math services to first through twelfth graders, who are six months or more deficient in math. The children are selected from a list of Title I eligible pupils in each school, who are found to be six months or more deficient in math as based on a standardized test score. In order to be eligible for ESEA Title I services, nonpublic schools children must reside in designated ESEA Title I target areas and must be achieving below minimum competency as indicated by scores on standardized reading tests, or by inability to speak English, or by handicapping conditions.

Through participation in the program, the children are helped to improve their proficiency in mathematics.

The method of instruction is small group instruction in a class of about ten students. The classes meet a minimum of once per week to a maximum of five times per week. The class period is approximately 45 minutes. The children who are more deficient in their math ability are seen more often. The program has been in operation throughout the school year. Small group sessions and individualized instruction are planned and offered on a sequential basis.

In addition to remedial instruction, children who are selected by their teachers, are offered guidance services. The teachers and clinical personnel feel that a percentage of the children in the program also have emotional problems that are interfering with their learning and are offered guidance as an aid in their learning.

In those cases, where the funding is assigned by the individual school districts, the pupils are offered the aid of experienced paraprofessionals, who assist the teachers in their instruction. A group of 121 children were also offered the aid of a homework helper program. The homework helper program is administered by teachers who select and supervise teenagers in the community, who meet with selected youngsters in the first through eighth grades and help them with their homework.

Evaluative Procedures

To determine whether as a result of participation in the Corrective Mathematics component of the Central ESEA Title I nonpublic school project, the mathematics achievement scores of the students will show a statistically significant improvement, using the real post-test score and anticipated post-test score.

Subjects: All participants in the Corrective Mathematics Component.

Methods and Procedures: Appropriate achievement test in mathematics, and test levels were administered to all participants on a pre/posttest basis as follows: Grade 1, Metropolitan Achievement Readiness Test; grade 2, MAT Primary II; grades 3 and 4, MAT Elementary; grades 5 and 6, MAT Intermediate; grades 7 and 8, MAT Advanced; grades 9, 10, 11 and 12, Stanford Test of Academic Skills.

Analysis of Data: Data was analyzed by the "Real (treatment) Posttest vs. Anticipated (without treatment) Post-Test" design.

Tests of statistical significance, using split plot factorial designs, were run to determine various effects of treatment combinations of supportive services received by participants in the corrective mathematics component. The factorial designs will be plotted to take into account the following interaction effects: For each of the six levels of mathematics achievement tests used in this component, three factorial were generated for the following combinations: (1) Corrective Mathematics treatment only with Corrective Mathematics treatment and Clinical-Guidance treatment, (2) Corrective Mathematics treatment only with Corrective Mathematics treatment and Homework Helpers treatment, (3) Corrective Mathematics treatment only with Corrective Mathematics treatment and Clinical-Guidance treatment plus Homework Helpers treatment. (Note: In the case of readiness levels, raw score pretest means and raw score posttest means were used instead of the historical

regressions model.)

In addition, the presence of paraprofessional supportive services was tested across each component of the factorial design.

A child was counted as having received supportive service if during the school year, he had participated to any extent (i.e. one or more times) in any of the supportive services.

Statistical significance was generated between pre and posttest scores for both treatments, and between treatment predicted means and actual means.

Time Schedule: Pretests were administered shortly after the beginning of the program if posttest scores from Spring 1974 did not exist, and posttests were administered shortly before the termination of the program.

Chapter III

Findings

The 1974-1975 Corrective Mathematics Services for Eligible Title 1 Non-Public School Pupils was found to be extraordinarily successful in accomplishing its major objective of improving pupil competency in mathematics. Test results indicate that highly significant growth was achieved in every grade of the target population. The average growth was ten months greater than would have been anticipated had there been no special program.

In the first grade comparison of pre and posttest raw

scores on the Metropolitan Reading Readiness Test showed a statistically significant gain.

Table I presents an analysis of mathematics achievement using real versus anticipated posttest scores for grades two through eight.

Table I shows that there is a highly significantly main effect. The pretest scores are significantly less than the posttest scores for grades two through eight.

Table I also shows a statistically significant interaction effect: $p < .001$. The interaction with component refers to the combined effects of the component categories, corrective mathematics only, corrective mathematics plus clinical guidance, corrective mathematics plus Homework Helper and corrective mathematics plus clinical guidance and Homework Helper.

Another source of variance which was analyzed was the additional use of paraprofessionals in the classroom. The use of paraprofessionals did not have a statistically significant effect on test scores.

Many paraprofessionals were assigned to the class late in the school year. Many of them did not have enough time to show a significant interaction on test scores.

Paraprofessionals are assigned through decentralized ESEA Title I proposals. The late assignment of the paraprofessionals represented variances from the individual districts decentralized proposals and not from the central proposal.

The Scheffe Post Hoc Test of the mean differences was used to investigate the significance of the eman differences between the four component categories. The results are reported in Table II.

Table II shows that the corrective mathematics plus Homework Helper component and the corrective mathematics plus Homework Helper and clinical guidance component showed a significantly smaller anticipated score, than the corrective mathematics alone or the corrective mathematics plus clinical guidance components. The children selected for the corrective mathematics plus Homework Helper and corrective mathematics plus Homework Helper and Clinical Guidance Components had done poorly on their previous achievement testing. Based on their previous testing they were expected to do poorly on the present mathematics achievement testing. However, these children made substantial gains.

The children, who were given corrective mathematics only made a gain of .911 years in grade equivalent scores, the children who were given corrective mathematics plus clinical guidance made a gain of .768 years in grade equivalent scores, the children who were given corrective mathematics and homework helper plus clinical guidance made gains of .849 years in grade equivalent scores, the children who were given corrective mathematics plus homework helper made gains of 1.209 years in grade equivalent scores. The children who were given homework helper and corrective mathematics made the highest gains. These gains were statistically significant $p < .001$. The children in all of the other components also showed statistically significant gains $p < .001$.

TABLE I

Analysis of Mathematics Achievement Using Real Versus Anticipated Post Test Scores for Grades 2 - 8.

N	Source	Mean Square	d f	F Ratio
9294	Pretest vs. Posttest	219.189	1	734.240 ***
	Interaction with Component	2.192	3	7.343 ***
	Para-professionals	.182	1	.610

*** Significant beyond the .001 level

TABLE II

Computed Scheffé Values for Component Anticipated and Real Post Test Means for Grades 2 - 8.

Mean Type	Corrective Math Only		Corrective Math and Clinical Guidance		Corrective Math and Homework Helper		Corrective Math and Homework Helper +Clinical Guidance		Scheffé Values Levels .001	.01
	N	Mean	N	Mean	N	Mean	N	Mean		
Anticipated	5896	3.588	3214	3.421	121	2.443	63	2.803	.323	.253
Real	5896	4.499	3214	4.189	121	3.652	63	3.682		

The children selected for clinical guidance showed scores that were similar to the children selected for corrective mathematics alone. The gains which these children made were also similar to the gains made by the children given corrective mathematics alone. However, since no control group was used we can hypothesize that were these children not given clinical guidance their gains might not have been as large.

Table III presents the analysis of mathematics achievement by grade using real versus anticipated posttest scores. The interaction in Table III refers to the combined effects on two component categories corrective mathematics only and corrective mathematics plus clinical guidance. The other two components contained a relatively small number of children and do not allow for analysis by grade.

Table III shows that the main effect is significant in all grades from grade two to grade twelve. In all these grades the observed score on total mathematics achievement is significantly higher than the anticipated score. In addition in grades two, three, four, five, six, nine and ten there is a significant interaction effect. The Scheffé Post Hoc Test of Mean Differences was used to investigate the significance of the mean differences between the two component categories in each grade. The results are reported in Table IV.

Examination of Table IV seems to reveal a consistent pattern. In grades two and three the anticipated scores of the children in the corrective mathematics plus clinical Guidance component are almost equal to the scores of the

children in the corrective mathematics component alone. Their real observed scores are significantly lower than the scores of the corrective mathematics component alone.

However, since no control group was used we can hypothesize that the children in the corrective mathematics plus clinical guidance component would have not made the gains they did make had they not been given clinical guidance.

In the fourth, fifth, sixth and ninth grade, the children in the corrective mathematics plus clinical guidance component had significantly lower anticipated scores than the children in the corrective mathematics component only. At the end of the period of instruction the children in the corrective mathematics plus clinical guidance component had made statistically significant gains. However, since no control group was used we do not have definitive evidence of the effectiveness of clinical guidance. We can hypothesize, however, that were these children not given clinical guidance they would not have made the gains in mathematics achievement which they did make. In grade ten the children who were in the corrective mathematics plus clinical guidance scored lower than their anticipated scores, while the youngsters given only corrective mathematics showed a statistically significant gain. It would seem as if having these tenth grade youngsters in guidance lowered their achievement level. However, the relatively small sample and the absence of a control group make these results difficult to interpret.

TABLE III

Analysis of Mathematics Achievement by Grade
Using Real Versus Anticipated Post Test Scores

Grade	Test	N	Source	Mean Square	d f	F Ratio
two	Metropolitan Achievement Test Primary II	1247	Pretest vs. Post Test	415.383	1	2191.520***
			Interaction	3.469	1	18.300***
three	Metropolitan Achievement Test Elementary	1857	Pretest vs. Posttest	983.397	1	4572.223***
			Interaction	9.961	1	46.311***
four	Metropolitan Achievement Test Elementary	1589	Pretest vs. Posttest	366.252	1	1261.719***
			Interaction	7.395	1	25.475***
five	Metropolitan Achievement Test Intermediate	1401	Pretest vs. Posttest	374.574	1	1308.293***
			Interaction			15.697***
six	Metropolitan Achievement Test Intermediate	1623	Pretest vs. Posttest	319.463	1	1100.651***
			Interaction	2.722	1	9.379***
seven	Metropolitan Achievement Test Advanced	1102	Pretest vs. Posttest	503.090	1	1189.545***
			Interaction	1.375		3.251***

TABLE III (continued)

Grade	Test	N	Source	Mean Square	d f	F Ratio
eight	Metropolitan Achievement Test Advanced	601	Pretest vs. Posttest	189.289	1	434.228***
			Interaction	1.605	1	3.683
nine	Stanford Test of Academic Skills	154	Pretest vs. Posttest	99.370	1	77.632***
			Interaction	10.677		8.342**
ten	Stanford Test of Academic Skills	111	Pretest vs. Posttest	22.331	1	13.136***
			Interaction	26.390	1	15.523
eleven	Stanford Test of Academic Skills	86	Pretest vs. Posttest	37.381	1	33.951***
			Interaction	0.249	1	.226
twelve	Stanford Test of Academic Skills	34	Pretest vs. Posttest	5.585	1	7.153*
			Interaction	1.777	1	2.276

***Significant beyond the .001 level

**Significant beyond the .01 level

*Significant beyond the .05 level

TABLE IV

Computed Scheffé Values for Component Anticipated and Real Post Test Means Per Grade and Test Type

Grade and Test Type	Mean Type	Corrective Math Only		Corrective Math (N) and Clinical Guidance		Scheffé Values Levels .001	.01
		N	Mean				
Grade Two Metropolitan Achievement Test Primary III	Anticipated	828	1.361	(419)	1.352	.0858	.0672
	Real	828	2.304	(419)	2.137		
Grade Three Metropolitan Achievement Test Elementary	Anticipated	1228	2.066	629	2.021	.0747	.0585
	Real	1228	3.263	629	2.999		
Grade Four Metropolitan Test Elementary	Anticipated	1031	3.070	558	2.899	.0932	.0729
	Real	1031	3.883	558	3.509		
Grade Five Metropolitan Achivement Test Intermediate	Anticipated	871	4.011	530	3.893	.0969	.0759
	Real	871	4.847	530	4.564		
Grade Six Metropolitan Achievement Test Intermediate	Anticipated	1073	4.857	550	4.593	.0929	.0727
	Real	1073	5.581	550	5.195		

TABLE IV (continued)

Grade and Test Type	Mean Type	Corrective Math Only		Corrective Math and Clinical Guidance		Scheffé Values Levels .001	.01
		N	Mean	N	Mean		
Grade Nine Stanford Test of Academic Skills	Anticipated	111	7.300	43	6.819	.668	.523
	Real	111	8.981	43	7.670		
Grade Ten Stanford Test of Academic Skills	Anticipated	80	8.200	31	8.410	.907	.710
	Real	80	9.675	31	8.348		

Recommendations from the 1973-14 Evaluation

The evaluation for 1973-74 made 14 recommendations:

1. It is highly recommended that this worthwhile and successful program be recycled and expanded.

Implemented

2. If possible, supplemental and additional program funds from federal or local sources should be allocated at the beginning of the year. This will provide all participants with a full year's services, and free administrative time to expand program outreach and training.

Implemented

3. The problems of delayed test results affecting diagnosis and scheduling might be best resolved by eliminating machine scoring of tests. In addition to the above-mentioned problems, it was felt that machine scoring did not achieve the objective of saving teacher time.

Implemented

4. Diagnostic training might focus on other methods in addition to standardized test analysis--particularly in light of possible continued machine socring of tests. Emphasis might also include broader areas of learning problems, such as verbalization, perception association, recognition, etc.--in addition to areas of math competency.

Implemented

5. Individualized and small group instruction should be offered in more of the environments, to enable all of the children

particularly the slower ones, to progress at their own rates, through activities directly related to their needs, and to develop greater independence and mastery over the subject.

Implemented

6. Efforts should be given to help some of the weaker teachers improve their questioning techniques to encourage more sustained thought, increase their diagnostic sensitivity and supportiveness to individual students, and become more child-oriented rather than lesson-oriented in their instruction.

Implemented

7. More small group and varied workshops should be offered to suit individual teachers' interests and needs. Because the teachers' backgrounds and experiences differ considerable, particularly because the program has been in operation eight years, such varied group training could well serve the teachers' differing training needs. Such workshops might include, for example, curriculum and methods for individual grades, instruction in use of particular materials, and means of accomplishing specific academic goals, such as verbal problrm solving. Moreover, small group training sessions would provide opportunities for teachers to share ideas and learn from each others' experiences. Similarly, intervisitations among teachers might be encouraged to take place more frequently.

Implemented

8. The variability and significance of the Title I

umbrella concept could be greatly enhanced for the students' benefit by increasing the functional interactions between the units. The relationships are now informal and based on the initiative of individual teachers. Occasionally teachers meet to discuss student needs and achievements, and to prepare team efforts for common skill goals or joint activities. Frequently, however, little or no communication exists. Although the interrelationships should remain flexible, recommendations for joint diagnosis, team efforts to respond to individual student needs, and overlapping and joint activities should be offered. Opportunities should be provided for Title I teachers in each school--guidance, math, ESL, speech, and homework helper staff--to meet periodically to share ideas. Suggestions for positive interaction might be included in the training sessions. Greater interaction might improve the impact of the Title I effort by integrating the students' learning environment, increasing teachers' sensitivity to students' learning needs and developments, and reinforcing collective goals.

Implemented

9. The Board of Education might well consider amending its eligibility requirements for non-public school children to permit students who live in Title I areas, and who demonstrate deficiency in mathematics but not necessarily additionally in reading, to be served by this Title I math program. Priority might still be given to those students who are deficient in reading as well as math. The present system, whereby students

are only tested for eligibility in math who are on a Title I eligibility list (indicating residency in a Title I area, and deficiency in reading) deprives students who need help in math, but not in reading, from the help they need in mathematics.

Not Implemented because of Board of Education policy

10. While continuing to respect the divisions between the programs, communication with the non-public school staff should be increased and encouraged to help interpret the program and remove the stigma of remediation; to improve scheduling and the relationship of this program to the activities missed; to improve diagnosis; to share ideas about students' needs and achievements; and to further expand the positive catalytic effect of sharing effective innovative methods and approaches with the regular school program. The non-public school staff seemed very receptive to greater interaction, and pleased when it occurred.

Implemented

11. Training and assistance in the effective use of paraprofessionals should be provided to all teachers with district Title I paraprofessionals, to assist them in more sensitive and better use of this important educatonal resource. More advantage should be taken of the opportunities for individualization and personal development possible with this rare teacher/student ratio.

Implemented

12. The parent program, which is effectively operating on a small scale, exposing parents to methods and techniques of the program and encouraging them to share these with their children, should be expanded to include more schools and more parents. The formal and traditional report card should also be revised to be more inviting and appropriate to the tone and nature of the program.

Implemented

13. If possible, junior high and high school students should be selected for the program prior to scheduling of classes. As recommended by two principals, the students could then be scheduled for the Title I classes, and would not have to regularly be pulled out of departmentalized classes. This may not affect the outcome of this program, but it would significantly help the Title I students in their other subjects.

Implemented

14. Students should be encouraged, and tools made available to continue some of the activities outside of the program. Many of the games and materials are well-suited for use by children alone or in groups in an unstructured setting; many could be made by the children themselves. This would enable the students to extend the benefits from the program and to increase their mastery over the subject.

Implemented

Chapter IV

Summary of Major Findings, Conclusions, and Recommendations

In all grades the children showed statistically significant gains of their observed scores over thefr predicted scores. In grades two, three, four, five, six, and nine the supportive guidance services showed statistically significant gains. In grades two through eight the corrective mathematics component, the corrective mathematics plus clinical guidance, the corrective mathematics plus homework helper, and the corrective mathematics and homework helper plus clinical guidance components all showed statistically significant gains. The addition of paraprofessionals did not produce significant gains which may be accounted in part by their assignment to class late in the school year.

Conclusions

The 1974-1975 corrective Mathematics Services for Eligible Title I non-Public School pupils was found to be extraordinarily successful in accomplishing its major objective of improving pupil competency in mathematics test results indicate that highly significant growth was achieved in every grade of the target population. The average growth was ten months greater than would have been anticipated had there been no special program.

Recommendations

1. Recycle and expand the present program.

2. Training and assistance in the effective use of paraprofessionals should be provided for all teachers. The paraprofessionals should be assigned to the corrective math teacher in the classroom at the beginning of the academic year.

3. The parent program should be expanded to familiarize parents with the methods and techniques of the program.

4. Communication between the Title I teachers and the non-public school teachers should be continued.

5. In service training and visitation between Title I teachers should be continued.

6. Teachers should be chosen who have had experience in teaching mathematics plus classroom teaching experience at more than one grade level.

Chapter V

Exemplary Program Abstract

Corrective Mathematics Services for Eligible Non Public School Pupils 1974-75

Code 609 (23, 24, 25, 26) 720-801

This program consisted of corrective mathematics services plus supportive services. The supportive services were: guidance, homework helper and paraprofessionals. The program was implemented exactly as described in the central proposal. Late assignment of paraprofessionals represent variances from decentralized ESEA Title I proposals.

Instruction was in small groups plus periods of individual instruction where applicable. The program emphasized a positive approach to remediation, an abundance of materials, a discovery approach to learning real life experiences and the use of games.

Analysis of the data showed that the average student gained ten months over what his predicted score would be in ten months of instruction.

The supportive services of guidance and homework helper were shown to have had a statistically significant effect on learning as measured by test scores. The paraprofessional services did not have a statistical effect.

Revised

Appendix A Corrective Mathematics Services for Eligible Non-Public School Pupils Function No. 09-59628

Use Table 26, for Historical Regression Design (6-step Formula) for Reading and Mathematics.

26. Standardized Test Results

In the Table below, enter the requested assessment information about the tests used to evaluate the effectiveness of major project component/activities in achieving desired objectives. This form requires means obtained from scores in the form of grade equivalent units as processed by the 6-step formula. (see District Evaluator's Handbook of Selected Evaluation Procedures, 1974, p. 29-31) Before completing this table, read all footnotes. Attach additional sheets if necessary. [25]

Component Code	Activity Code	Test Used 1/	Form		Level		Total N 2/	Group ID 3/	Number Tested 4/	Pretest		Predicted Posttest Mean	Actual Posttest		Obtained Value of t	Sub-Group 5/
			Pre	Post	Pre	Post				Date	Mean		Date	Mean		
6 0 9 2 3	7 2 0	MAT	F	F	pri	pri	1345	2d	1216	9/74	1.281	1.358	4/75	2.248	2191.52	<.001
6 0 9 2 3	7 2 0	MAT	F	F	elem	elem	2003	3rd	1838	9/74	1.848	2.051	4/75	3.17	4572.22	<.001
6 0 9 2 4	7 2 0	MAT	F	F	elem	elem	1695	4th	1574	9/74	2.675	3.010	4/75	3.751	1261.72	<.001
6 0 9 2 4	7 2 0	MAT	F	F	int	int	1469	5th	1386	9/74	3.592	3.966	4/75	4.740	1308.29	<.001
6 0 9 2 4	7 2 0	MAT	F	F	int	int	1677	6th	1610	9/74	4.327	4.768	4/75	5.560	1100.65	<.001
6 0 9 2 5	7 2 0	MAT	F	F	adv	adv	1098	7th	1080	9/74	4.808	5.192	4/75	6.195	1189.55	<.001
6 0 9 2 5	7 2 0	MAT	F	F	adv	adv	742	8th	588	9/74	5.499	5.966	4/75	6.80	434.23	<.001
6 0 9 2 5	7 2 0	STASK	A	A	I	I	225	9th	154	9/74	6.609	7.166	4/74	8.615	77.63	<.001

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1/ Identify the test used and year of publication (MAT-58, CAT-70, etc.).
2/ Total number of participants in the activity.
3/ Identify the participants by specific grade level (e.g., grade 3, grade 5). Where several grades are combined, enter the last two digits of the component code.
4/ Total number of participants included in the pre and posttest calculations.
5/ Provide data for the following groups separately: Neglected (code as N), Delinquent (code as D), and Handicapped (code as H). Place the indicated code letter in the last column to signify the subgroup evaluated.

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Revised

Appendix A Corrective Mathematics Services for Eligible Non-Public School Pupils Function No. 09-59628

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Component Code	Activity Code	Test Used 1/	Form Pre	Form Post	Level Pre	Level Post	Total N 2/	Group ID 3/	Number Tested 4/	Pretest Date	Pretest Mean	Predicted Posttest Mean	Actual Posttest Date	Actual Posttest Mean	Obtained Value of t	Sub-Group 5/
6 0 9 2 6	7 2 0	STASK	A	A	I	I	135	10th	111	9/74	7.677	8.259	4/75	9.304	13.14	<.001
6 0 9 2 6	7 2 0	STASK	A	A	I	I	97	11th	86	9/74	7.808	8.332	4/75	9.469	33.95	<.001
6 0 9 2 6	7 2 0	STASK	A	A	I	I	34	12th	34	9/74	8.238	8.659	4/75	10.138	7.15	<.05

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1/ Identify the test used and year of publication (MAT-58, CAT-70, etc.).
2/ Total number of participants in the activity.
3/ Identify the participants by specific grade level (e.g., grade 3, grade 5). Where several grades are combined, enter the last two digits of the component code.
4/ Total number of participants included in the pre and posttest calculations.
5/ Provide data for the following groups separately: Neglected (code as N), Delinquent (code as D), and Handicapped (code as H). Place the indicated code letter in the last column to signify the subgroup evaluated.

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